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RECORD OF INFORMAL CONFERENCE

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Technical Advisory Committee

of the

National Cottonseed Products Association  
and

Administrative and Scientific Staff Members  
of the

U.S. Bureau of Agricultural Chemistry and Engineering

January 17, 1941

Conference Room 4005 South Building

U. S. DEPARTMENT OF AGRICULTURE

In attendance during a part or all of the meeting were the following:

CHAIRMAN:

H. T. Herrick, Assistant Chief, Bureau of Agricultural Chemistry and Engineering

H. G. Knight, Chief, Bureau of Agricultural Chemistry and Engineering

H. A. Donovan, Assistant Chief, Bureau of Agricultural Chemistry and Engineering

D. F. J. Lynch, Director, Southern Regional Research Laboratory

H. S. Paine, Chief, Agricultural Chemical Research Division

R. S. Hollingshead, Assistant Chief, Agricultural Chemical Research Division

G. S. Jamieson, Senior Chemist, Agricultural Chemical Research Division

R. W. Riemenschneider, Biochemist, Agricultural Chemical Research Division

C. E. Swift, Research Fellow, Agricultural Chemical Research Division

Henry Stevens, In Charge, Allergen Investigations

F. L. Teuton, Chief, Information Division

E. R. Barrow, Chairman, Technical Advisory Committee, National Cottonseed Products Association, Barrow-Agee Labs., Inc., Memphis, Tennessee

R. H. Fash, The Fort Worth Laboratories, Fort Worth, Texas

T. C. Law, Law & Company, Inc., Atlanta, Georgia

H. S. Mitchell, Swift & Company, Chicago, Illinois

A. S. Richardson, Procter & Gamble Company, Chemical Division, Ivorydale, Ohio

Andrew Schwartz, South Texas Cotton Oil Company,  
Houston, Texas



In attendance during a part or all of the afternoon session at the Washington Hotel, were the following:

- H. T. Herrick, Assistant Chief, Bureau of Agricultural Chemistry and Engineering
- H. G. Knight, Chief, Bureau of Agricultural Chemistry and Engineering
- H. A. Donovan, Assistant Chief, Bureau of Agricultural Chemistry and Engineering
- D. F. J. Lynch, Director, Southern Regional Research Laboratory
- O. E. May, Director, Northern Regional Research Laboratory
- T. L. Swenson, Director, Western Regional Research Laboratory
- P. A. Wells, Director, Eastern Regional Research Laboratory
- H. S. Paine, Chief, Agricultural Chemical Research Division
- R. S. Hollingshead, Assistant Chief, Agricultural Chemical Research Division
- G. S. Jamieson, Senior Chemist, Agricultural Chemical Research Division
- R. W. Riemenschneider, Biochemist, Agricultural Chemical Research Division
- C. E. Swift, Research Fellow, Agricultural Chemical Research Division
- Henry Stevens, In Charge, Allergen Investigations
- F. L. Teuton, Chief, Information Division
- G. S. Meloy, Division of Cotton Marketing, Agricultural Marketing Service
- E. R. Barrow, Chairman, Technical Advisory Committee, National Cottonseed Products Association, Barrow-Agee Labs., Inc., Memphis, Tennessee
- R. H. Fash, The Fort Worth Laboratories, Fort Worth, Texas
- T. C. Law, Law & Company, Inc., Atlanta, Georgia
- H. S. Mitchell, Swift & Company, Chicago, Illinois
- A. S. Richardson, Procter & Gamble Company, Chemical Division, Ivorydale, Ohio
- Andrew Schwartz, South Texas Cotton Oil Company, Houston, Texas
- E. S. Haines, Institute of Cottonseed Oil Foods, Atlanta, Georgia.



MR. HERRICK: In the absence of Dr. Skinner, who you probably all know is sick at home with grippe, Dr. Knight has asked me if I would act in the position of Chairman at this meeting, and so I am going to do something that possibly is not necessary here, but I would like to have each man stand and introduce himself and just mention his connection. I think we all know each other, but sometimes it does help to make matters a little clearer.

(The members of the conference then introduced themselves)

MR. HERRICK: Dr. Knight, I wonder if you wouldn't like to say something.

DR. KNIGHT: Mr. Herrick, I really haven't any special message to give to this group. I think you know without my saying so that we are always very happy to have you with us at these annual meetings. They come like a ray of sunshine into the Bureau. We have carried on cooperative work now for a good many years and there has never been anything but the most friendly atmosphere. There may have been differences of opinion occasionally. However, those were honest differences which were adjusted nicely before the meetings were finally closed. I think you are all interested in the new developments that are taking place in the Bureau and the new direction which the Bureau's work is taking. There has been a process of evolution. As you probably know, I came here as Chief of the Bureau in 1927, taking charge of the new Bureau of Chemistry and Soils, which had just been organized, bringing together the research work in the old Bureau of Chemistry, -- made famous by Dr. Wiley's long work as its Chief, -- the old Bureau of Soils, the fertilizer work which had originally been a war baby and had been called the Fixed Nitrogen laboratory, and two Divisions from the Bureau of Plant Industry, so as to bring all the soils work together.

We had developed a philosophy which we thought represented fairly well the objectives of the Bureau, and might be expressed by the word "utilization"; that is, utilization of the products of the soil, utilization of the soil itself, and utilization of those materials which are added to the soil in the form of fertilizers. The Department grew and new outlooks developed, as they naturally do in a growing organization. We were reorganized a couple of years ago, and all the soils work was taken out, and there was placed in the Bureau the administration of the four regional laboratories. The Bureau today is about twice as large, - is two and a half times as large insofar as funds are concerned, - as it was during the period when we had the largest appropriation for the Bureau before the reorganization. We are still a utilization bureau, trying to develop efficiency in agriculture either directly or through those industries which are based on agriculture. And one of the great objectives, or the main objective, of the Bureau at the present time is to develop new and wider uses as represented through the regional laboratories.



You will be interested to know that we have now occupied three of the Regional Laboratories, the Western, the Northern, and the Eastern, and we are still getting in the laboratory equipment. Work has been started in all three of these laboratories and by the first of July we hope they will be going full blast, - even though some of the minor contracts will not be completed at that time. We have been a little disappointed in the progress made in the construction of the Southern Regional Laboratory. I don't know whether any of you have been down there recently but we hope to be in that laboratory some time within the next month. I don't think the laboratory will be as far behind the others in operation, for the fact is that while the buildings are being constructed, the main equipment of the laboratory is being fabricated, and it will be put in rather quickly, so that I think the Southern Regional Laboratory will also be ready for actual full work by the first of July. I may be a little optimistic in regard to that but I think not. However, we have taken the opportunity to start work which may be considered in a measure as field work. And through the cooperation of the local institutions we have been able to get some laboratory space, so that actually we are not so far behind in our research as one might think.

I think you can understand that during the past two years we have been working under unusual pressure in getting the buildings and programs completed, so we have not been able to give as much attention and time to the research in the old line activities, as we would like. For the Regional Research Laboratories we have spent in the neighborhood of ten millions of dollars during the last three years (i.e. the fiscal years 1939, 1940, and the current fiscal year 1941) in construction work and in preparation for the research that is to go on during the next few years. We have had a comparatively small staff of leaders in each one of these laboratories, whose business it was to develop programs, search the literature so that when they got ready to go into the laboratories they would be ready to go.

We have developed cooperative understandings with each of the forty-eight States. The main memorandum covers studies of the current programs and the development of new programs which will be in line with, but not in duplication of the programs that are carried on in the several States. In developing these programs we have had the advice and help of a large number of scientists, including scientists in the industrial field.

I believe we have had the finest cooperation that we could possibly expect from the industries that are making use of agricultural products or are interested in the potential uses of agricultural products in an industrial way. It has been very surprising to me that industries which normally would give us practically no information at all about the research work they have been carrying on, have opened their books to us and have told us rather frankly what their research programs were, keeping back of course such information as may be patentable, or other matters of that nature. But on the other hand, they have



gone over our programs and made suggestions which were vary, very valuable, and through the suggestions they made, gave us further insight into the programs they were developing. That confidence in our endeavors, which has been built up during the past few years, I think is going to prove exceedingly valuable. The cotton oil companies and the different cotton and oil associations have been exceedingly helpful, as have other important industrial organizations. We have contacted I suppose fifteen hundred industrial organizations, and I can recall now not a single case where they didn't show a fine spirit of cooperation. Gentlemen, I think that is a very auspicious beginning, even with recognition that there are some people who feel that the opportunities for these laboratories are limited.

Let me again state, as I think I stated to you last year, that we acknowledge the early and continued help which we have come to count on from this group. The fact that you have carried on and cooperated in research with us, and have supported a fellowship with us for a number of years, has had very definite influence upon the interest that Congress has expressed in the fields of work in which we are laboring at the present time. That probably was not evident several years ago, but the interest of you gentlemen, there is no question, has created interest by the Southern Congressmen and the Southern Representatives in Congress. A good many of the Northern Representatives are already interested because of their contact with industries using agricultural products.

Now, I have made a rather lengthy introductory speech. I hope today that you will take the same attitude as you have taken in previous conferences we have had. This is a round-table discussion. We are all interested, we are all on the same footing. I will be with you as much as I can today. I know you have a number of problems you wish to discuss. Some of them may have far-reaching effects. I appreciate very much this opportunity of talking with you for a few minutes. Thank you.

MR. HERRICK: Thank you very much. I think it might be well before we continue if I ask Mr. Lynch to say something about the program of the Southern Laboratory as it has developed up to the present point, referring of course to the work on cottonseed, and then if there is anything else in the Southern Laboratory program in which this group is interested, it can be brought out in the general discussion. I would like to introduce Mr. Teuton, who is head of our Information Division here in the Bureau. He came in a little late.

MR. LYNCH: As Dr. Knight mentioned, we are very much interested in utilization, and also as he mentioned, it is probably of great interest to this group that the Southern Laboratory is the one we haven't occupied yet. We have had construction difficulties. They were laying the linoleum only about three weeks ago in the Research and Administration Wings, and the Service Building should be completed at the same time. They are trying out the boilers, have wood fires in them and we have hopes of having the inspection engineers down to inspect the buildings in February prior to their acceptance. It may be a little difficult for



them down there at that time. Probably will have to live in tents on the Government per diem, since that is Harde Gras Season, but we would like to have them down there and complete the inspection so we could get into the Laboratory by the first of March.

We have, as you know, utilization research programs on cotton, sweetpotatoes, and peanuts. Of course, sweetpotatoes will not be of much interest to this committee. Also, a part of the cotton program will not be, i.e., cotton lint. However, the work on linters and cottonseed, including the oil, is of considerable interest to this group, as well as our peanut oil research. We laid the cornerstone of the laboratory a little over a year ago and are still in construction agonies. I think that not all of this group are familiar with the organization of our laboratory. We will have seven divisions, and I will mention first those of no interest or of very little interest to you. There is a Sweetpotato Division and a Cotton Processing Division. We hope we can get out contracts for a small but rather complete cotton mill. It will be airconditioned throughout and not airconditioned as you see the usual cotton mill, with just a steam vaporizer hanging up on the wall. The whole mill will be airconditioned. This mill will be in the Cotton Processing Division. We have another division on cotton called the Cotton Chemical Finishing Division. This group will investigate the addition of desirable properties to the cotton fabrics by the application of special finishes. Just now this research is very popular and we believe it has almost unlimited possibilities. We also have a Cotton Fiber Research Division. Those four divisions will of course touch very little on the work in which you are directly interested. We have two service divisions. One is the Analytical and Physico-chemical Division. This division will do all the analytical work of the laboratories and I think we have already been troubling Mr. Barrow in Memphis with this type of work. It will touch intimately the work of the cottonseed oil processing industry. We have also been over to Houston and have probably been making a nuisance of ourselves to Mr. Schwartz and his company.

Another service division is the Chemical Engineering and Development Division. A great deal of their work will pertain to processing and studies of processing of cottonseed oil and peanut oil. The work of that division will be of interest to this Committee. The seventh division is the Oil, Fat and Protein Division. All their work will be intimately connected with that of the industry represented by the Committee here. Dr. Markley is heading that work and has been in rather close contact with Mr. Mitchell of Swift & Company and Dr. Richardson of the Procter & Gamble Company, as well as Mr. Barrow and Mr. Schwartz. We haven't gotten over to Fort Worth and Atlanta as often as we would like, but we expect to trouble you gentlemen more from now on.

Of the various divisions of the Southern Regional Laboratory, the Oil, Fat and Protein Division is the most advanced. We are of course getting our personnel together, although we have had to go slowly until we do get into the laboratory. I can say that Dr. Markley has his specifications out and many of his orders placed for supplies and equipment. In fact, before he can purchase more equipment, he will have to obtain



more money from somewhere. We are doing some actual laboratory work at the present time. It so happens that there is a promising problem on peanut oil, and Markley thinks he has a good lead toward its solution so we have two men carrying on some work on it at the present time. We expect of course to study all the processes for the production of cotton-seed oil and necessarily will throw more of our effort along the lines that show the greatest promise of success.

I think it has been discussed with this group that we expect to do some work on solvent extraction. We will tie up the nature of the oil obtained with the composition and quality of the oil, and we hope to uncover some worthwhile facts, as has been done with soybean oil. As a matter of fact, Markley's former experience with soybeans will necessarily influence some of the work on cottonseed and peanuts. He has also been in touch with Procter and Gamble, Swift & Company and several of the cotton-seed oil companies and we are seriously considering every bit of advice that we can get from these companies. As Dr. Knight pointed out, this is a utilization program and we have to tie up all our research with the utilization of these products and must, therefore, depend on the processing and consuming industries to help us in pointing the way which our research endeavors should take. I think you probably are already acquainted with a great deal of what we intend to do and I don't know whether it is worth the time to mention it here.

MR. HERRICK: I think I would give a very brief outline, Mr. Lynch, and the details can be brought out in the discussion.

MR. LYNCH: We are not only interested in the yield of oil but we are interested in the nature of the constituents that compose the oil as a result of differences in the processing procedures. This is especially true if we undertake work on solvent extraction. No doubt, with different solvents and different conditions of extraction various amounts and kinds of constituents are taken out. The moisture content is most important, for instance the study on the amount of moisture in soybean flakes for solvent extraction markedly affects the type of oil produced. We are going to study critically the effect of moisture on extraction of cotton-seed, as well as the temperature, pressure, and the solvent-solid ratios. We have some indication from industry that flaking of soybeans is comparatively easy compared with some of the problems we will probably encounter in flaking cottonseed. The particle size of the oil seed to be extracted is important as well as the time, efficiency of the extraction, the recovery of oil from the micella and the effect of the refining on loss of color.

We hope to make a sort of rational approach to the problem of extending certain uses and developing new uses for cottonseed oil through the recovery of byproducts:- the phosphatides, sterols, pigments, vitamins, etc. There is, no doubt, a lot of information that is needed on these subjects. We not only intend to study crude and refined oils but we hope and expect, in the light of information to the effect that there is a lot of work to be done and probably some interesting information to be obtained, to investigate tank settlings, foots, filter press cake, winterizer press cake, soap stock and acidulated soap stock, as well as the constituents



from the deodorizer. We expect to study these materials by means of the newest physical and chemical methods and techniques. Probably we will have to prepare a number of these natural products synthetically and work out the solution of the problems backwards. Particular effort will be made to develop methods for the recovery of the phosphatides from the foots. At the present time phosphatide work is quite popular as these products are finding constantly wider application. In refining crude oil we hope to recover the sterols from the soap stock and still pitch.

We are also going to study the so-called catalytic hydrogenation-dehydrogenation of cottonseed oil and also the catalytic oxidation of cottonseed oil, to produce short chain acids, such as are found in coconut oil and palm oil, if possible. That is rather a large order but it is exciting quite a little interest and we hope to do some work on it. The selective hydrogenation of cottonseed oil will be investigated with a view of avoiding the production of undesirable byproducts and improving the quality of the hardened oil which goes into shortening and margarine and in the production of hardened oils for nonedible uses.

I think that generally covers our main ideas at the present time. We expect to follow some of the lines our Chief made as an important point: that is, we will be principally concerned with utilization. Naturally at one time some project will be more pressing than another. If we think that we can get a particular problem over, we intend to throw our whole force on it if necessary, because this research program will stand or fall on utilization. In this connection our contacts with you gentlemen who represent industry are most important, as we don't expect to bring out some process and start a whole new industry to handle it. If our results are going to be of value, the present industrial set-up will have to use them and their advice relative to their value and utility to industry will practically control our efforts in this direction.

We expect to be with you gentlemen most of today. Some of us I think have to go to the radio station around noon for about ten minutes. This afternoon when we get down to details you will want to ask questions.

MR. HERRICK: I might state, for the interest of the group, that we hope to have the other Directors at the luncheon, so maybe you will want to go on and shoot some questions at them. I am now going to throw this meeting open for general discussion and I will ask Mr. Barrow if he wants to discuss anything.

MR. BARROW: In reply to Dr. Knight's very interesting opening remarks and on behalf of the Committee, I want to assure you that we fully reciprocate the feelings that he has expressed, -- that this is one of the high spots in our experience as members of this Committee. In fact we might term it the only real genuine compensation we get out of our work, this fine opportunity for contacting you gentlemen once a year.

As some of you probably know, this Committee has been in existence for quite a long time. It was created back in 1921 as a result of a very far-reaching and broadminded vision on the part of the then Secretary of Agriculture, the distinguished Mr. Henry Wallace, the father of our recent



Secretary of Agriculture and who, on Monday, will be made the Vice President of the United States. Mr. Wallace invited the cooperation of our industry with the Department of Agriculture. I recall, -- and I think there are some members of this Committee who were present at the first meeting which we held in Washington, I think, in 1922. If you do recall that occasion you can see quite a difference now in the genuinely pleasant association which we have here and the very strict formality which prevailed over the meeting at that time. It was presided over by one of the Assistant Secretaries of Agriculture. It was a committee created, and I think known at that time as an Interbureau Committee. Bureau Chiefs I believe, were the only representatives present, and I recall how guarded they were in everything they had to say. If our committee has accomplished nothing more in its existence than to bring about cordial, friendly, frank relationships between our industry and the Bureau of Chemistry, a branch of the Department of Agriculture, I think we have fully justified our existence. We have had our difficulties and our troubles, and you as scientific men can appreciate that we sometimes feel that the work which we are trying to do is work which is not fully appreciated and valued by our industry. Nevertheless we have gone ahead and it is very encouraging to have you say, Dr. Knight, that the work which this industry has done may have had some effect in shaping larger and broader programs of research.

This Committee comes back to you this year under a different title but with the same personnel. You will recall that it was formerly known as the Basic Research Committee, which Committee last year asked to be discharged and recommended the creation of a committee to be known as the Technical Advisory Committee of the National Cottonseed Products Association. This recommendation was adopted by our Board of Directors and the Committee created, and the personnel of the Basic Research Committee was named to the Technical Advisory Committee.

We are tremendously interested in the new regional laboratories, and particularly interested in the outline which Mr. Lynch has just given us on the very broad program. I have no doubt that there exists in the minds of the members of this Committee some ideas of other projects which we, perhaps through our closer association with the industry, believe to be of vital importance, and which we hope will be undertaken at some time by the Regional Laboratory. It is possible that in the discussion today some of those problems that have confronted us might be mentioned.

I think the whole country is very keenly alert to the results to come from the Regional Research Laboratories. Unfortunately, there seems to be a feeling in the minds of some that these laboratories will in a way take the place of all other research. And it is our problem right now to try to prevail upon our industry that this very useful and valuable cooperative relationship which we have here in this Bureau should be continued. Yesterday the Committee had a session with Mr. Swift and his co-worker, Mr. Riemenschneider, and in the presence also of Mr. Hollingshead, who is Assistant Chief of the Agricultural Chemical Research Division. We are very much gratified and satisfied



with the progress of the work and the line which it has taken. The Committee approved the work of the past year and has made no suggestions toward changes in the program that is now being carried out. We also had the pleasure of a review of our old friend Dr. Stevens' very fine work, and we are very, very proud indeed of him as one of our postgraduates from this Fellowship. I think with those remarks we may proceed with the discussion.

DR. KNIGHT: We are very proud of the training you gave Dr. Stevens.

MR. BARROW: I don't claim all the credit for that however.

Mr. Lynch, has the personnel of the Oil, Fat and Protein Division of the Laboratory been set up yet? How many men have you engaged?

MR. LYNCH: We will have by the time we get into the laboratory between eight and ten men. Just now we have four but we already have three certifications from the Civil Service Commission which are returnable within a month. They are very promising men and we will put them in the laboratory as soon as they report for duty.

MR. HERRICK: How large will that division be eventually, Mr. Lynch?

MR. LYNCH: Eventually there will be a personnel expenditure in salaries of about fifty thousand, somewhere around fifty or sixty thousand. They, of course, will study not only the cottonseed oil and peanut oil but cottonseed protein and peanut protein.

MR. BARROW: Fifteen or sixteen men in the oil studies?

MR. LYNCH: Yes. At the same time of course we will have men in the analytical division but of lower grades. The routine men will do practically all of the analytical work for the Oil, Fat and Protein Division. We will have some men who will also be doing analytical work on sweetpotatoes, on cotton linters and fibers, that is, preliminary analytical work. The Engineering and Development Division will probably be available and due to the advanced organization of the oil division, they will probably do oil processing development work first.

DR. KNIGHT: You understand, of course, that under the law, we work on commodities. But necessarily, our laboratory program actually comprises coordinated work on the constituents of several commodities. Therefore, in fulfillment of the law and for purpose of discussion before Congress, the breakdown of the laboratory program is on a fiscal basis for the different commodities, or very largely so. And, as you scientists understand, if we work on the commodities, peanuts and cottonseed for example, we would conduct work on the oils from these seeds in one section while proteins of both commodities would be carried by another section, and so on.

MR. HERRICK: Mr. Lynch, is the outline that you have given there being realized?

MR. LYNCH: Not as yet. We have this outline written up and it has to clear the Department and the State Experiment Stations.



MR. BARROW: I am sure the members of this committee will be very much interested in that relation.

DR. KNIGHT: You have the first breakdown on that, haven't you? Is that in shape so that we can give members of this committee copies so that they can see the general set-up? When it comes down to the projects themselves, it is all right, but you haven't yet cleared with the Department on this. I think this committee should be given copies of this.

DR. RICHARDSON: Is there a suitable mailing list to which you could add the names for receiving copies of that and any other releases when they become available?

MR. LYNCH: Mr. Teuton, who is in charge of our Information Division, says yes.

DR. KNIGHT: I think we should put the members of this committee on our mailing list for all the releases in connection with this cotton work in which you are interested.

DR. RICHARDSON: I realize the request to add even one name to the mailing list might be unreasonable. It depends on the set-up, of which I have no detailed knowledge at all.

DR. KNIGHT: No, I presume that the only parts you are interested in are those researches that have a bearing on cotton oil, and I don't believe you would want the whole set-up for the entire laboratory.

MR. MITCHELL: There are some of us, Dr. Knight, who would be interested in the other projects in the other laboratories.

DR. KNIGHT: Would it be possible for you to indicate what you are interested in? I think that could be worked out if you would do that before the close of the meeting. I make that statement because I don't want to burden you with materials that would be of no special value to you.

MR. BARROW: Mr. Lynch, you have mentioned the study of processing of cottonseed in the outline here. Is that work to be done down there in the Southern Regional Laboratory or in cooperation with some of the other experiment stations?

MR. LYNCH: Of course there are exceptions to every statement, but most of the work which is carried on, especially in the Agricultural Experiment Stations, at least in the States of our region, has usually been directed towards production. There are some other States, although we haven't many in our region where research is being carried on in utilization. Most of the work at State Experiment Stations has the agronomic slant and is directed toward producing more and better crops and plant products.



MR. BARROW: Such as the work in Texas A. & M.

MR. LYNCH: Tennessee is carrying on utilization work, but we expect to carry on a great deal more, especially at the Laboratory and it will probably be decided in each instance the State in which we can best carry on the cooperative work.

MR. SCHWARTZ: Mr. Lynch, with reference to the processing work which you mentioned in connection with your solvent extraction process, do you expect to extend your investigations to include the conditions that affect production by the pressing methods?

MR. LYNCH: If we get any encouragement from the industry and they think we should, we probably would.

MR. LAW: Mr. Chairman, I think right at that point it might be well to bring out the set-up of this Committee of ours. It is not selected at random or to honor any particular individual. This Committee is composed of the representatives of the three largest companies in the industry that not only produce a finished product but the raw material as well. So they are familiar with the cottonseed right on through to the finished product. The other three members represent the three divisions of what we call the Cotton Belt: the Southwest, the Valley, and the Southeast. They are members of commercial laboratories that occupy a position in between the processor of the raw or crude products and the manufacturer of the finished product. While the members of the three larger companies represent the industry in connection with their company's work, the other three would, more or less, represent the little man who operates the smaller, individual plants and carries the processing from seed all the way through to the finished product. So as far as it is possible to do so, I think it would be well for this Oil, Fat and Protein Division, which is the most important of all of the divisions to us, to be given special study and clearance by this Committee, not only because of the effectiveness of it, but because that might save you a lot of grief. You would have the benefit of our experience, much of which is not recorded anywhere. I don't know if that is an unreasonable suggestion but here is a committee that has for years and years devoted much time and thought to the various problems that you will encounter in following the program outlined by Mr. Lynch. I believe it would be quite a good thing, if possible to do it, to clear your plans with this Committee, if that is not an unreasonable suggestion.

DR. KNIGHT: I would not consider that unreasonable, but here is our general plan. I am wondering if it will accomplish the results you have in mind. We had expected to set up advisory committees on these several commodities. Members of these advisory committees would be representatives, we hope, from the experiment stations and representatives also from the industries, without necessarily confining representation to a particular region; but we would endeavor to pick the best men possible who have knowledge of the problems before us. We discussed that plan rather frankly with the experiment station directors in our several regional meetings and they have accepted our proposal in principle.



Now you see what we have accomplished. Instead of having these projects passed around to all of the experiment stations in the several States and, in addition, attempting to have conferences with all industries concerned, we can call together the representatives such as those who are sitting on this committee and get the job done, and done promptly; without losing contact with any of the groups represented. We hope to have for the cotton oil committee a representative from each division of the cotton oil industry. Would that meet with your approval?

MR. LAW: Yes, that broadens that out a bit and I see that you are right. Our contact is more or less from a manufacturing standpoint, and the experiment station is more from a utilization standpoint, you might say, so there is a division there.

DR. KNIGHT: For example, if we had a representative from this group here, he could bring back to your group the problems that had been discussed and the experiment station representatives could bring back the same information to his group. We have had that plan under very serious consideration,--how we could work the thing out, how we could find out whether the projects here would be valuable not only from the standpoint of research but whether they conformed to the desires of the producers, and also how we could, through a committee group, secure guidance which would keep us from doing work which somebody else is doing or has done without our knowledge. Now you gentlemen are here as representatives of cottonseed crushers and cotton oil refiners and you know pretty well what our projects are, and you know also what is now being done by your industry in the way of research. And, certainly, if representatives from this group are on our Laboratory committees we can be advised of the research conducted by your industry, -- and that should forestall wasteful or unprofitable duplication of work in the Regional Laboratory, or by your laboratories. If we had a small group, that might be worked out and perhaps that would fulfill the object of your suggestion. That was our general plan.

MR. LAW: I simply intended to bring out the point that we would like to be furnished information as to what was going on in the Regional Laboratory. There are two points, Mr. Lynch, I would like to emphasize just as a matter of discussion. I was delighted to hear you say that you will have as one of your objectives the correlation of the process and the quality of the product. I think that is very essential. We have been having, time and time again in our work some problems for which, frankly, we have never been able to find the answer. We have been very practical about it. Oil has been produced and refined in our area by methods of refining which result at times in the production of oils very different from the usual oil. There is doubtless something in the processing of the crude material that produces such differences. In fact we have tied it in with certain methods of processing in the crude mill, but we don't actually know what it is. It has been encountered in cottonseed oil and it is very true of peanut oil. Peanut oil refined by this alkali method, when fresh, will produce entirely different results from the same crude oil after standing for two or three weeks. A very pronounced indication of the difference is that in the refining test



you have a very light yellow color, when you add your lye to it when the crude oil is fresh, and a very dark, almost black, color if the lye is added after the crude oil is two or three weeks old. Now what causes that difference? That is a very important problem because the shrinkage differs from two to three percent depending on whether the oil is refined when fresh or after standing a while. I am referring to peanut oil, not to cottonseed.

MR. BARROW: As long as Mr. Lynch has mentioned it, there is a point that might have a bearing on what he has just said. You contemplate a study of the phosphatides of the crude oil, and undoubtedly that study will open up a field for many new lines of investigation. I might illustrate the thought I had in mind by stating a fact with which most of you gentlemen are already familiar, namely, that it is possible to wash crude cottonseed oil with water, and reduce the refining loss from 25 to 50 percent, but owing to the sludge formed there is a compensating loss that renders the process uneconomical. This sludge contains most of the phosphatides which were present in the original crude oil. If a project of this kind could develop a method of utilizing that sludge, or the phosphatides, or other substances which are present in the sludge from the crude oil, it would certainly create an increased value for that product which would be reflected in an increased return to the producer of the raw material. I just mention that as one line of investigation that probably would have a bearing on your program. That would seem to be a very practical problem and one that might be solved with profit to all concerned. I believe that such work is being very effectively done in the processing of soybean oil. And in fact, in the processing of soybean oil a considerable portion of the phosphatides are recovered. A similar method might be applied in the processing of the oil from cottonseed.

MR. MITCHELL: I think Mr. Schwartz had something like that in mind and the same thought was running through my mind. Just what sort of comparision are you going to make between the solvent extracted oil and that produced by the present method? Will the work be directed towards the development of a solvent extraction method or toward the development of a satisfactory method for handling cottonseed, -- which I don't think we know so very much about at the moment -- or will the work be directed to comparision of the byproducts of the two methods, -- determining through such a study the most efficient and the most satisfactory method of handling cottonseed and cottonseed oil from the viewpoint of final results?

MR. LYNCH: It looks' to me like you would have to stand or fall on the success or lack thereof of the whole process anyway. If it is possible to make a thorough study of the present process and the byproducts thereof, it might be possible to improve present methods of obtaining cottonseed oil. On the other hand you can go into the possibilities of extraction by different solvents, and I understand there is some new extraction equipment coming out. One particular man has been developing this and thinks he has a revolutionary idea. With regard to Mr. Barrow's point, I agree if you can get a greater return for your main product, that is, the oil, by reducing this refining loss you would be better off. If you could get your present price for oil, or even a little lower, and at the same time



could get something additional out of your byproducts so that your total over-all return is better that advantage would no doubt reflect in the price you can pay for cottonseed.

MR. MITCHELL: That was my idea, the research should be based on developing a satisfactory method, not merely improving the method of extracting cottonseed.

MR. LYNCH: We have heard a hundred times that this research is utilization. Now, if we turn out the nicest and best laboratory product you have ever heard of, and it was marveled at by all the scientists in the world, and it does not use any more cottonseed or does not improve any existing uses, we have just missed the boat.

MR. MITCHELL: I can see an extraction method as being the most efficient method of getting oil out of seed and of getting better oil, but I can also conceive that the total value of the product by the present method might be greater than the total value from the solvent extraction method.

MR. LYNCH: Of course that may be true and if we should obtain any indications of this fact, it would be sufficient reason for stopping all extraction work and throwing our efforts on other methods.

MR. MITCHELL: That is the point I had in mind.

MR. LYNCH: However, everyone is intrigued with the unknown and there is not much known about solvent extraction of cottonseed. It might be possible to develop a highly efficient process. You always think you can get more out of investigating the unknown. It might be well to know all about what you get by solvent extraction, but unless we have real indications that it is going to make for a better utilization of cottonseed and peanuts, we should probably have to stop that work.

DR. STEVENS: Mr. Law, just for the record, would you repeat the statement of your problem? I think the reporters may have had a little difficulty in getting it.

MR. LAW: Probably I didn't give it very clearly, but the processing of the raw material in what is known as the crude mills should be studied as to its effect on the finished product, not only as to the quality of the finished product but also for the quantity yield. To explain it more fully --

DR. STEVENS: You gave an example of peanut oil.

MR. LAW: When the oil is refined there is a shrinkage or loss of volume in producing the finished product, and if we can reduce that shrinkage and still produce a good quality oil, we have made a big improvement. That is the thought we had. The actual experience that I indicated there was that in peanut oil it frequently occurs that when the oil is produced at a crude mill and refined by the alkali process while fresh, the refining loss or the shrinkage is very much less than occurs with the



same oil after it has stood several weeks. This behavior is indicated not only in the results obtained but also by the physical conditions surrounding the refining itself which are very different. The color of the oil is quite different when refined fresh, -- I mean the color of the mixture of alkali and oil is very different when refined fresh than when it is refined after standing a while. The finished product is apparently of the same quality but there is just less of it.

MR. BARROW: In other words, the crude oil mill produces crude cottonseed oil and sells it as such, but in reality the price paid for the crude oil is determined by the quantity and quality of the refined oil produced from it. Therefore, any modification of the process which would improve the quality of that crude oil would in effect bring about a higher return to the producer of the oil.

MR. FASH: Mr. Law's remarks can tie in with some points that were raised yesterday in talking with Mr. Swift, that is, the necessity of studying those constituents of oil which are in the unsaponifiable fraction other than the inhibitols that Mr. Swift has been studying. I believe, Mr. Law, the answer to the problem you have is involved in those unsaponifiable constituents. I have been running a series of tests just on that specific point. The work is not completed, but results so far indicate that the unsaponifiable matter, other than the phosphatides, are involved in the problem you have. The phosphatides have a certain effect which we all recognize but there are other constituents that produce the results you are speaking about. And while I know that the tests are not finished the results are of such a nature that you can almost predict the outcome insofar as the crude is concerned. I know nothing of the effect of these constituents on the refined oil, and that is what I suggested that Mr. Swift investigate. Now on that subject, - in recent years the processing of oil in the factory has been changed because of the introduction of continuous refining. This method produces refined oil with a large amount of soap, which soap has to be removed by water washing and subsequent vacuum drying. In the process of water washing, there is left in the refined oil, which is subsequently dried, water to the extent of about 0.4 to 0.5 percent. This water contains soap in solution. When that oil is dried, the soap that was in solution in the water is dissolved as a dry soap in the refined oil. Now, that dried soap dissolved in the refined oil may persist in significant amounts even after washing until you think it ought to have come out. And that residual soap may affect the keeping qualities of the oil. In the laboratory, our refining tests are made in enameled cups which are equivalent to glass. Mr. Swift's work is on refined oil which has been produced in glass-lined equipment. It is possible that there may be iron soaps, for example, that are left in the factory refined oil which would have an entirely different effect than sodium soap alone. The laboratory refined oil will not contain any of this dry soap dissolved in the refined oil. The factory produced refined oil will contain this dry soap dissolved in the oil. Therefore, following what Dr. Schwartz stated yesterday concerning the desirability of starting with a factory deodorized oil for the study of the unsaponifiables, I think we ought also to follow that practice not only because of these constituents



which occur in the factory deodorizing process, but also because there are in this oil other constituents which are not in the laboratory oil.

MR. SWIFT: I might say that the most recent oil shipment which Mr. Barrow sent us was ordinary run-of-the-mill prime summer-yellow refined oil, obtained with a view of getting an average sample of refined oil, and because it was felt that anything we found in our investigation of that oil would pertain more to the ordinary conditions.

MR. FASH: That was produced in the laboratory there.

MR. BARROW: The point presented by Mr. Fash is well taken: working on laboratory samples of oil perhaps might give results not altogether comparable with factory produced oil. As to the significance of the dried soap in a finished oil, I am not prepared to say just how serious that problem may be, but some of these gentlemen in the refining business here could answer that.

MR. MITCHELL: Do I understand, Mr. Fash, that you feel that there is soap left in the water washed oil?

MR. FASH: That is right, in water washed, vacuum dried oil.

MR. MITCHELL: Even after double dried washing?

MR. FASH: Yes.

MR. MITCHELL: Our experience has been that it is very, very small.

MR. FASH: We are now dealing with an effect which is produced by very, very small quantities, colloidal materials.

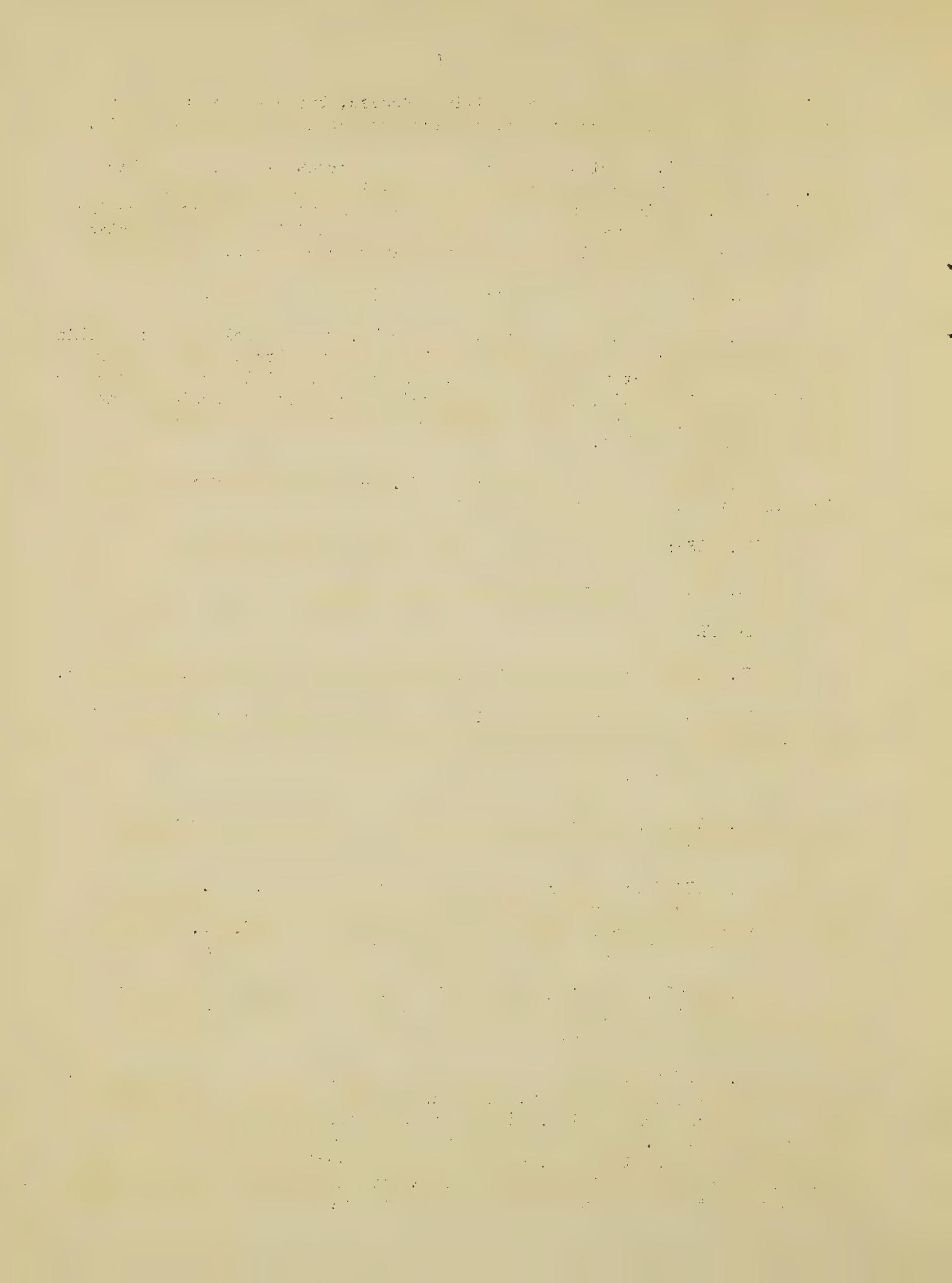
MR. MITCHELL: Oh yes.

MR. FASH: And the laboratory refined oil is not the same as the factory refined oil.

MR. MITCHELL: I agree with that. That is true. Mr. Barrow, I wonder if you would give this group an idea as to the program of research which was generally agreed upon to be followed by the N.C.P.A. yesterday at our meeting? Would it be well to summarize that as far as possible?

MR. BARROW: I think it would be. I would be glad to outline it. However, I believe Mr. Swift could perhaps give you a better outline of all the work than I could.

MR. SWIFT: I am glad to do that and I would like to be supplemented by a repetition of some of Dr. Richardson's remarks, because I have been trying to keep them in mind. I haven't set them down yet and I value those suggestions. The work a year ago concerned the first fraction from a molecularly distilled oil, and this first fraction contained most of the inhibitols and unsaponifiable matter. After the investigation had proceeded, it appeared that the antioxidant concentrates we obtained were not as



interesting as the antioxidant concentrates we had obtained from crude cottonseed oil, and although the work on the molecularly distilled first fraction was not dropped, it was postponed in order to put more concentrated work on that antioxidant concentrate from the crude. The work has proceeded to a point where, by means of solvent separations, an interesting antioxidant concentrate has been obtained which probably does not represent more than one or two constituents and which should yield itself to separation and some identification as to just what it is. The technic and the method used were set forth yesterday and Dr. Richardson had some comments to make on the advisability of some changes in our program. I would like to have him summarize his remarks if he will. I really would like to have a record of it so that I could make use of those suggestions because they were very valuable and appreciated.

DR. RICHARDSON: The program presented yesterday was the program of the Fellowship itself. I didn't understand that the Committee took any action on that program. It seemed to me that we accepted it with some detailed discussion, but not with any request for a change in the program which was presented to us. Correct me if that is wrong, Mr. Barrow.

MR. BARROW: I think we approved the procedure being followed by Mr. Swift.

MR. SWIFT: The only reason I suggest that you repeat is that I would like to have a record of that so that I could make use of those suggestions.

DR. RICHARDSON: Let me repeat the background of what I said, since there is not time to repeat the detailed discussion. For a number of years we have been sure that there are very active antioxidants in crude cottonseed oil. The possibility of important antioxidants in refined oil has not been entirely overlooked, but superficially the evidence has pointed to the presence of the more important and more active antioxidants in the crude oil. Those antioxidants in crude cottonseed oil are apparently of the nature of phosphatides. Of course there are other oils of which that is not true. Recent work indicates that antioxidants in the refined oil, which is very nearly free from phosphatides, may also be extremely important. Failure to realize the full effect of these has to do with failure to remove them from the oil. The fact that these antioxidants in the refined oil persist in the finished edible product may explain why their effect is generally underestimated. I think that the recent work of the Fellowship as presented in the last published paper is part of a body of work that is of great importance, because it begins to evaluate components about which we have known but little, namely, the antioxidants in the refined oil. As one individual member of the Committee, I express something approaching regret that the work has been quite recently diverted to a study of the crude oil. But the other members of the Committee didn't share that feeling and I did not intend to stress my opinion unduly by repeating it today. Now I have tried to cover the background of the greater part of an hour's discussion in a very few minutes and you will have to tell me whether I have included the points you want for the record.

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MR. SWIFT: Yes, you have, because yesterday during our discussion I was talking so much myself that when I got through I realized what you had said was not down where I could read it and think about it, and now it will be. I appreciate your review of those remarks, because in studying this work and trying to make anything we do find of real value, or to make it worth doing at all, we find advice and comments such as those help us in determining the direction of our work, so that we may end up with some real worthwhile work. I appreciate Dr. Richardson's repetition.

MR. BARROW: I would like to say on behalf of the Committee that we are all pleased to have Dr. Richardson note his exceptions to the suggestion pointed out recently by Mr. Swift. However, as a committee I believe we all felt well satisfied with the statement by Mr. Swift that he intended to carry on parallel series on refined oil, and possibly fulfilling all of the suggestions by that plan. It seemed to me that his statement that the first fraction contains practically all except a small portion of antioxidants, may be justified. Therefore, rather than pursue a narrow program limited to refined oil we are having a broad plan of research which includes consideration of both refined and crude oil. After all, the main purpose is to isolate and identify the antioxidants in the cottonseed oil. And I think, as a result of our discussion yesterday, that our program is going to be benefited by being broadened to include the suggestions that Dr. Richardson offered.

DR. RICHARDSON: I question, but do not necessarily deny, the conclusion that the first fraction of which you speak contained substantially all the antioxidants. To me the problem is this, does it?

MR. SWIFT: Dr. Richardson said yesterday that certain work in which he and his associates were interested seemed to indicate that there were possibilities in the middle fractions of the distilled samples of cottonseed oil and that there were interesting observations to be made. His remark that the antioxidants or inhibitols, which may be of real interest, might be in the middle fraction instead of the first fraction, may be true, although in our investigation the results didn't seem to indicate so. But our work was no doubt not extensive or exhaustive, so that it could be and we may have overlooked that possibility.

DR. RICHARDSON: Speculations as to what antioxidants may be present in the middle fractions are not as important as the basic fact that the first fraction is itself very complex. And we have not put our fingers on the antioxidant content even of the first fraction. It is a very small part of the first fraction. I would like, if I may speak for Mr. Fash, to emphasize again what he emphasized, the importance of prooxidants in the first fraction or any other fraction.

MR. RIEMENSCHNEIDER: We had a slightly different viewpoint, than that which has been expressed by Dr. Richardson, as our reason for working on crude oil. It has been generally conceded that crude oil is a better source of antioxidants than refined oil, and it is more stable. Therefore, we attacked the problem with a view of trying to isolate an active antioxidant from crude oil that could be returned to a finished oil and thus produce a more stable final product.



DR. RICHARDSON: From that viewpoint, I think that there is doubtless more promise of development of a successful new procedure than is likely to result from work on the crude oil. But even so, that promise lies in the fraction to which we have not, in the later work, given major attention, namely, in the acetone-insoluble fraction produced in that recent procedure which you followed.

MR. SWIFT: We haven't tackled the phosphatides, because they constitute such a problem as would require our whole attention. The omission of them from our study at present does not mean that given the time and opportunity we would not investigate the phosphatides.

DR. RICHARDSON: If we accept that viewpoint, then I think we will find that the interesting antioxidants are present in the refined oil as well as in the crude oil. That is, of course, just a prediction that I am not prepared to prove completely now and if we are going to get into this detailed discussion --

MR. BARROW: We spent a lot of time yesterday in discussing with these gentlemen the progress of the work on which they are now proceeding and on the general acceptability of the program as outlined by them, with the modifications which they have recognized as being pertinent. I believe it would be a mistake to reopen that discussion now because we have a number of interesting things we would like to learn and discuss. I think I am stating the matter correctly when I say we approved the program with the modifications which you aptly brought out.

MR. LAW: We were discussing division 7 or the Oil, Fat and Protein Division. So far this morning we have given our entire attention to oil alone. I would like to ask Mr. Lynch if there will be some work at the Southern Regional Laboratory in connection with animal nutrition on fat and protein and what will be the concept concerning that phase of the program?

MR. LYNCH: We don't expect to do anything on the actual feeding of protein to livestock. However, if we have sufficient information or advice with regard to the production of certain protein products obtained by processing cottonseed in a certain way which would indicate it to be more beneficial or more desirable as a livestock feed, we would study the production of that product or feed. But we would not study, according to my present understanding at least, whether or not that feed was good livestock feed, that is, nutritionally, if you get my distinction there.

MR. LAW: But the information you would develop would be of great value to those who are seeking it.

MR. LYNCH: Yes, I talked this over with a former member of this committee, Mr. Ward, and if for example there were developed some method of production which would make cottonseed meal more desirable as a feed, we would study its production. If we went into solvent extraction, something which I don't think anybody knows much about, it might be necessary to carry out some nutritional work on the meal thus produced.



Mr. Mitchell may be able to correct me there. We are already in contact with the Tennessee group at Knoxville who are extracting cottonseed meal to remove part of the protein. They want to use part of it as industrial material and use the residue in stock feeds. Well, in extracting the protein it is possible that you may be extracting the most desirable constituents so far as feed use is concerned. We had quite a discussion a month ago on the production of plastics out of cottonseed hulls. They have some very good examples by the way. They are fractionally extracting protein from the meal and putting it into their plastic, which gives the cottonseed hull plastic properties of both a protein and a lignin plastic; similar to that which we are making with bagasse and wood flour. The latter work was done at Madison, Wisconsin by the Forest Products Laboratory. At Tennessee they are extracting some of the protein and mixing this protein fraction with the plastic moulding powder. It makes a very good plastic, but when we asked them, "Are you going to throw away the rest of that cottonseed meal?" they said, "Of course not, we are going to use it for feed." Obviously this protein residue will be different from the original cottonseed meal as far as feeding value is concerned and it is possible you might take most of the nutrients out of the cottonseed by such extraction. And it is therefore necessary that the nutritional value of the residual protein be investigated. A similar condition might arise in the case of solvent extraction of cottonseed for the production of oil. You have to sell your cottonseed meal and of course with the hydraulic pressing process for the production of cottonseed oil, your protein is sold as feed. If you want to go into industrial utilization of protein, such as the production of films or fibers, the heat and pressure of the hydraulic process must be avoided because it causes the protein to deteriorate. You probably know that some very good protein fiber has been made on an experimental basis from several plant proteins, and especially from peanut protein. We had some samples here over a year ago, and we had some samples at the New Orleans meeting a year ago last May, -- actual textiles made out of peanut protein, -- but such proteins cannot be used for fiber if you use any heat at all. At the same time you have to sell a large part of that meal for feed. If you start solvent extracting for oil we will have to know something about the feeding value of the extracted meal, which is now really known only for hot processed meals. In the case of meals from which you have taken some of the protein and put it into the cottonseed hulls to make this plastic, it is obvious the meal must be different and, it might be very close to worthless, nutritionally.

MR. LAW: To develop this thought just a little further, -- these figures are not by any means accurate but they are satisfactory for illustration and consideration, -- over a period of time the commercial value of cottonseed cake is practically 75 percent of the value of the oil, and the commercial value of peanut cake is about 50 percent of the value of the oil, and of soybeans (which we are not dealing with this morning) I expect the cake is worth more than the oil, because there is so much meal produced. So it is vital that we keep in mind the factors that affect the nutritional value of oil seed byproducts and what is going to happen to the cake in any of the new processes of oil extraction.



MR. LYNCH: Mr. Law, doesn't that tie up with the point Mr. Mitchell made and the fact that we are trying to keep this one objective in mind--to repeat as I have a number of times -- that we are principally interested in utilizing these commodities. We may get a few percent more of oil by solvent extraction but if we cannot use the cake at all, or perhaps have to throw away a number of the byproducts, not as such but in the form of meal, we have not accomplished anything. We have to come out with sufficient return to the cottonseed oil industry so that they can pay the prices, -- at least the present prices, and we hope, higher prices for the cottonseed which they buy. We can't turn to solvent extraction unless we can also use the meal and all the byproducts which have to add up to produce an adequate return. We are going to study the other processes. To the technician, solvent extraction is very popular at this time, but if it does not sell any more cottonseed we can't spend money on it, and the ones who can tell us the possibility of such developments are you gentlemen.

MR. BARROW: Dr. Knight, in our meeting last year you made a statement to the Committee outlining the provisions of the Act authorizing the establishment of the Regional Laboratories and also the modifications or amendments to the Act which broadened it to permit research on products to be utilized as food. Am I correct in that? Has there been any change in that?

DR. KNIGHT: No, there has been no further change. The Agricultural Appropriations Act of 1940 specified: "...including research on food uses." That permits food research in the Regional Laboratories, and accordingly we have included food uses of apples in our program and we have included the frozen pack work at the Western Laboratory.

MR. BARROW: The point I think Mr. Law intended to bring out is covered in a letter he wrote me in November after the A.O.A.C. meetings, when he had an informal conference with Dr. Skinner, and Mr. Ward. Mr. Ward seemed quite concerned at the time because he felt that there was some specific prohibitions or limitations pertaining to any work at the Regional Laboratories directed to utilization of cottonseed products as feed. Since that time the policy has been made quite clear and I merely wanted to bring it out again this time. Mr. Ward is directly concerned, as you know, with the feeding value of cottonseed cake and hulls. He was very much impressed by the reported progress that is being made in increasing the digestibility of proteins of soybean meal and he had in mind suggesting that possibly some parallel work be done in the Southern Laboratory on edible products of cottonseed and other feeds -- aiming at improved or increased utilization in the form of livestock rations. Let me expand my reply to your question about research on foods, Mr. Barrow. I mentioned that Congress included a provision for study of food utilization problems in the Appropriations Act of 1940. By inference, perhaps, this provision might suggest expansion or alteration of our present programs to promote increased utilization of farm products as food or feedstuffs. For the present, however, we must recognize several factors that limit future expansion of the research programs -- particularly in the direction of food utilization. The original and still the primary intent of this appropriation is to expand the outlets for farm products. We cannot



ignore the fact that the underlying principle of the regional laboratory idea is to promote industrial utilization of agricultural raw materials for manufactured commodities in addition to those consumed as food. We are also faced with this problem: the Chairman of the House Committee has announced that these laboratories must show that they are, through their researches, increasing substantially the uses of agricultural products, that is, for industrial purposes, within a period of ten years or the Laboratories will be closed. That statement was made in the House hearings last year. It has been repeated again in the hearings this year and we have accepted that challenge. I think you can understand, therefore, our determination to get started on problems which look as though they would lead to large volume uses for agricultural products. We are convinced, as the result of our surveys, that there is not very much opportunity to show a substantial increase in utilization of farm products, in total, by increasing the consumption of edible products. You may increase the consumption of butter, for example, but if you succeed in that there is very likely to be a corresponding decrease in the consumption of other edible fats. You may increase the consumption of flour, but that would probably decrease the consumption of starches and probably some proteins from other sources. We can increase to a significant degree the monetary consumption of food. In other words, if we go from the low-cost foods to the high-cost foods, such as milk and eggs and meats, we can increase very much the money value of foods consumed, and increase the acreage required to produce those foods. Nevertheless, we must recognize the fact that the human stomach cannot be expanded a great deal and similarly there is a limit to the total quantity of feed that can be consumed by the livestock population. Increasing the consumption of one crop does not accomplish our purpose if the end result is a corresponding decrease in demand for another. You will recognize our dilemma in charting a course for the Regional Laboratories. One obligation is to develop lines of research which will prove within ten years that we are increasing substantially the total consumption of agricultural products in this country. On the other hand a great many people are impressed by the need and opportunities for profitable research in utilization of edible products of agriculture. We are sympathetic, naturally, toward those who urge expansion of research in these fields, particularly if there is an opportunity for a real increase in utilization of food crops. I believe development of the frozen pack method shows promise there because by this method the usually perishable foods can be made available to the consumer in a fresh condition throughout the year. However, if there is a choice between conversion of raw material either into edible commodities, for which there are definite saturation levels, or into strictly industrial channels, I believe the best chance for increasing total utilization will be in the development of new industrial uses.

MR. LAW: At the same time, by increasing proteins, we might reduce the consumption, which is just the opposite of what you are working for.

MR. SCHWARTZ: Mr. Lynch, you mentioned in your outline something of the study of winterizer press cake. Did I get that correctly?

MR. LYNCH: Yes.



MR. SCHWARTZ: Was it your object to study the fractionation of cottonseed oil or possibly the utilization of the fractions that are now produced?

MR. LYNCH: I don't think I got your question.

MR. SCHWARTZ: Is it your idea to study the present process of fractionation of cottonseed oil into the more or less saturated fractions, or is it undertaken with a view of possible utilization of the fractions now produced?

MR. LYNCH: Probably both.

MR. SCHWARTZ: Utilization of the fractions now produced rather than a study of the process itself?

MR. LYNCH: We contemplate working on both the process and the products produced in this process.

DR. RICHARDSON: In connection with that, I would like to ask if attention is to be given to problems in plant nutrition in the course of your study of these fractions. Before pausing for an answer, let me remind you that after all, the cottonseed is a seed. If nature is 100 percent efficient, perhaps every ingredient in the cottonseed will contribute some useful effect on the reproduction cycle of the cotton plant. What is the material in the cottonseed for unless it is to make such a contribution? I wonder if your plan, the program, provides for the study of the constituents with respect to their possible effect on seed sprouting and plant growth?

MR. LYNCH: Of course all our results will be available for whatever use can be made of them and we are working with the State Agricultural Experiment Stations with the view to applying any information we may obtain which may be of use in agronomic or genetic studies they may be making or have in mind. The State Experiment Stations are primarily interested in problems of this type and we hope to be able to contribute information from our studies of the constituents that will be of value to them. They have a very comprehensive program throughout, from Virginia to the West Coast, and as far north as Arkansas and Missouri, on the production of cotton, which of course takes in this effect, that is, the agronomic and chemical study of constituents in the cottonseed. We do not want to duplicate their work but we do hope that we will get the information we need on utilization. That will be of great value in the study of the seed and its entire processing. We would like to know its composition and what happens to each constituent from the time when the seed is sold until the final products are offered to the consumer in the form of refined oil, or margarine, or shortening. We hope to be able to contribute some information to the agronomic work, but the main attack will no doubt be carried on principally by the State Experiment Stations. I think this brings us back to Mr. Law's question. It was two years ago, I believe, that Dr. Richardson was very much interested in the seed propagation.



We shall endeavor to expand the use of agricultural products by the production of useful articles. That is the basis of the solvent extraction process, that is, the production of industrial products from meal which cannot be made from hydraulic pressed meal. If we undertook the production of oil and meal by solvent extraction we would be glad to work very closely with Mr. Ward. I am sure he would be interested and would want to take some part in determining whether this meal can be used to advantage for feeding. If somebody else wants to make textile fiber out of it we will be glad to cooperate with them. We would like to have all such results come back to us for our guidance. The question arises, is this the best method of approach? That is what we hope to find out and I am sure we will. If the meal from solvent extraction is not suitable for feeding there might be some factory treatment, for instance, such as heating the cottonseed after the extraction, or some other treatment. Would such treatment make it more acceptable or more popular as a live-stock feed? That is part of the problem, finding out how to manufacture a salable product if it is to go into feed, I think that is within our province. But the actual buying and having a corral of cattle and carrying on all this feeding research, at present at least, seems to be outside of our province. If Mr. Ward wants to suggest that certain modifications are indicated by feeding trials with solvent extracted cottonseed meal, -- there are some indications from other laboratories that solvent extracted cottonseed protein is more digestible rather than less, -- I think it would be well within our province to add a step or change a step in the production to improve the nutritional value. Then the question arises, can it be put in without ruining the price of the product? I think all that study is well within our province, but the actual feeding of the animals and correlating the results -- for instance, a point Dr. Richardson made on young cattle and adult cattle -- that part of the work I think is outside of our province. In the same way, as Dr. Knight pointed out, if such nutritional work was within our province, we might spend millions of dollars and be a long time showing results.

DR. RICHARDSON: The main purpose of your laboratory would be very effectively served if the isolated constituents and fractions of the cottonseed, for instance, prepared in the Regional Laboratory were furnished to the experiment stations and other research centers in such a way as to contribute to their work on animal nutrition and on plant nutrition.

MR. LYNCH: We certainly hope to be able to do that. That is following out -- well, I don't know if you would call it a program but at least a method developed by the Assistant Chief some years ago. When I was at the laboratory at Ames, Iowa we had on the laboratory desk about two hundred thousand dollars worth of sorbose at the then current prices. Of course that price was eleven dollars for ten grams at the chemical supply houses. When we sent out from our pilot plant the largest shipment of sorbose ever made, they didn't know what evaluation to put on it, when it was shipped on a Government Bill of Lading to the U. S. Public Health Service. We were in contact with the carbohydrate research men throughout the country, and they knew we had sorbose and wanted to know how they could get it. We made it on a large scale, two hundred thousand dollars worth at chemical supply house prices. We sent a pound



or two to any man we knew was doing research on this material. We also tried to find out whether some of the colleges wanted it merely to put in a bottle and put it on a shelf, in which case we were not anxious to comply with their request, but any one working on it that we happened to know about, we not only sent him pure sorbose but, if interested, also the molasses that was left from the crystallization. A little while ago it was asked whether or not we are going to bring our results and our processes to the cottonseed oil producers plants, and I think that the answer to this question is yes, as it is well within our province. In the same way any product which we produce in the laboratories, if it is to be of any good, must be brought to the plants. We shall certainly supply samples of the products, for example, meals, protein fractions, oils, etc., to all interested persons and organizations in sufficient quantity to be of use to them.

MR. BARROW: You mentioned having a textile pilot plant at your laboratory. Do you contemplate having a crude oil mill unit?

MR. LYNCH: Yes, in our so-called pilot plant wing. I don't know whether any of you have seen our building, it is U-shaped, about 215 feet wide in front and has two wings 385 feet in length. The first construction contract included the front portion and one wing, entirely devoted to laboratories. In the other wing four of the 17 bays will be turned over to the textile mill. The rest of that wing is what we call our pilot plant floor. All of the Regional Laboratory buildings are alike and consist of three stories and a basement. Of course in New Orleans our basement is on the first floor so it is actually four stories in height. All of this area is available for pilot plant work on cottonseed and peanuts with the exception of part used for sweetpotatoes.

MR. BARROW: Your present plans do contemplate a pilot plant?

MR. LYNCH: It does and it will be right on that floor.

MR. BARROW: Will you use the different types of oil extraction machinery, hydraulic presses, and so on?

MR. LYNCH: We expect to. We will try to work on as small a scale as possible at first. However, as you gentlemen know, you can't step up from the laboratory into actual factory production and we will put in the necessary pilot plant work. Sometimes you run into trouble. We don't expect to put in full-sized plants. At that point we expect to come to you gentlemen.

MR. MITCHELL: That discussion brings up a question in my mind in connection with a problem you mentioned, selective hydrogenation. I am glad to see that on your list, but I am wondering how you plan to approach it. We know of course the method of hydrogenation results in various combinations of glycerides which affect the finished product particularly from the standpoint of performance in various baking operations. I wonder if you plan to study hydrogenation with the idea of developing a shortening or whether you will include hydrogenation in a



program that will have for its purpose the determination of particular characteristics of a fat, -- comparing characteristics of fats in practical use. I wonder if you will elaborate on that just a little.

MR. LYNCH: Unfortunately, I think you have me a little out of my own field, as I have never worked personally on hydrogenation, but I don't think, unless we are pressed by industry, that we will go into developing, -- say a brand new shortening. It will probably be a study of the constituents present and what their effects are, and in that case we expect of course to have the advice and counsel of the people who are making the shortening. We shall also study the effect of catalysts and conditions of hydrogenation on the individual constituents of the fat.

MR. MITCHELL: I just wanted to say in that connection if your committee did plan to carry on through into the finished shortening field, that it would be most necessary that you have a pilot plant in which you could make products on a small scale and then go from there into large-scale production, because otherwise you would not be able to evaluate properly your findings. I believe Dr. Richardson will agree with me when I say that you could probably put your entire staff of 15 or 16 men on that problem. How important the results would be from the standpoint of the industry as a whole, I wonder. That is the point I want to make in connection with that.

DR. RICHARDSON: Here is another point which I wish you would elaborate, if it is a fair request at this time. You spoke of increasing the use of cottonseed products through the medium of studying the constituents and fractions. That can be done through the medium of a specific effort to develop utilization of some one product or fraction. It can also be done indirectly through the medium of simply gaining more information about the identity and the properties of the different constituents. My question is intentionally somewhat indefinite, but I wonder, as your program is now planned, what will be your main method of attack?

MR. LYNCH: The constituents, the process and the product. The study of the constituents probably will advance further in the early stages of our investigations and no doubt affect the researches on the processes and products. If we find something that looks rather promising in itself but the production and sale of this one article results in the incomplete use of the raw material, we would probably have to change the direction of the research to other problems.

DR. RICHARDSON: At the present time, do you have some practical aims in mind on which you would start work, that is, aims directed to the specific utilization of this constituent or that in the cottonseed?

MR. LYNCH: Well, some of the men are very much interested in the phosphatides. They think they have some leads and some ideas. Since a man that is actually doing the work does get the more definite ideas, he will probably be allowed to try those out, and the only brakes we will put on him are the ones we have discussed here. It is possible you may be able to use those phosphatides and make interesting and useful compounds for



which there is a market. However, as I think Mr. Barrow pointed out, it may be a fact that their removal may result in higher costs of refining oil. We have to always bear that in mind. I believe some are very much worried about solvent extraction on that account.

DR. RICHARDSON: Have any of your men estimated how many pounds of phosphatides actually go to waste through the processing of cottonseed?

MR. LYNCH: I think the men have figures on that.

DR. RICHARDSON: It must be at least ten million pounds a year.

MR. LYNCH: It is large enough to make it encouraging to try something on it.

MR. FASH: Have you considered using phosphatides in the production of these emulsified asphalts? That is a new field of considerable and growing magnitude.

MR. LYNCH: There are possibilities in all colloid work to use phosphatides, I have heard the men discuss it a great deal. I am sure they have plenty of ideas, we have some of our own and we will no doubt get some from you gentlemen. Our problem is to make some of them click. I think I can cite an example in another field. We have a very good plastic man, doing very good work in the application of plastics in the textile field. He has just come down to our laboratory from industry and has in mind numerous developments in this field.

MR. HERRICK: I want to explain to this group that the Directors are going to broadcast on the Farm and Home Hour at 12:32. Mr. Barrow suggested that we adjourn at 12:15 for lunch. I have asked Dr. Stevens if he won't arrange to have the reporters at the hotel this afternoon so we can continue the discussion after lunch. I would suggest two o'clock. Mr. Lynch has to leave now but if there are any other points to be discussed we can go on a little longer.

MR. BARROW: Before Mr. Lynch leaves, I would like to bring up one other point we had discussed previously and get the reaction of your group here in Washington in regard to our fellowship work. Mr. Lynch, you will recall we had discussed before, -- whether this work properly belongs here in Washington or whether it would not be better if located at the Southern Regional Research Laboratory.

DR. KNIGHT: Mr. Lynch will have to go now.

MR. LYNCH: We will be at the hotel this afternoon.

(Leaving conference room)

DR. KNIGHT: Before I attempt to answer that question, and I would like to say that I am very much interested in the questions you have raised, Dr. Richardson. If we had known that the questions were to take that direction, we would have brought in some of our specialists from the



Laboratory so as to have developed for the record more of the technological details. So I think if it is agreeable to the group here, if you will allow us to extend the record more fully to answer some of the questions, it might be desirable.

DR. RICHARDSON: I am interested in those questions. I realize that I should not ask for too much detailed information on your program.

DR. KNIGHT: We shall be glad to answer them as far as we can. You have asked specific questions about details of a very extensive program and Mr. Lynch has been trying to answer from memory, and on the record. To ask one man to do that without access to his files is more than we should expect. Allow us the privilege to extend the record and we can answer more fully. You may wish to continue your inquiry and discussions at the meeting this afternoon. Regarding your question, Mr. Barrow, about location of the Fellowship, -- we have discussed that matter and we feel that we have no fixed opinion in regard to it. If you prefer to have the Fellowship here in Washington I believe satisfactory work can be done, and probably as well as in the Southern Regional Research Laboratory. If you desire to have the Fellowship transferred to the Southern Regional Research Laboratory, there would be one advantage: your Research Fellow would be associated with the group that is working on cotton utilization. Another advantage, -- you would probably have occasion to visit the Laboratory more frequently and see the work going on there. On the other hand, we certainly would miss very much the opportunity we have had the last several years of meeting with you here in Washington. I think it is very largely a matter of what your Committee would prefer. I don't think, as far as the progress of the work is concerned, that there would be much difference, if any. We have no decided opinion on this matter of location of the Fellowship.

MR. BARROW: Do any members of the Committee have any comments to make on that? One of the greatest compensations to this Committee for its services is the annual meeting with the administrative officers and scientists of this Bureau and we would be very reluctant to alter that plan. On the other hand, what you say is true, that the Fellowship would be in closer contact with the industry and with this Committee and members of the industry. We would like to become more familiar with the work that is going on. I think it is a question that the Committee should consider very carefully. We are glad to know that the decision rests with us.

DR. KNIGHT: If you prefer to have the Fellowship transferred to the Southern Regional Research Laboratory, either Dr. Skinner or I -- Dr. Skinner has always had a special interest in this Fellowship -- one of us would probably meet with you. That might not be easy to arrange but we would try to work out some plan so that our contacts could be maintained.

MR. MITCHELL: I think that information will permit us to discuss the matter further.

DR. KNIGHT: I wish you would discuss it. We are willing to comply with the decision of the Committee.



MR. LAW: The Regional Laboratories will permit Fellowships such as we have now?

DR. KNIGHT: Certainly. In fact, the Act has liberal provisions for cooperative work. It is even broader in that respect than the law covering our old line of work.

MR. HERRICK: Are there any other points the group would like to bring up before we adjourn temporarily? If not, then I suggest that we meet for lunch.

(Morning Session Adjourned at Twelve Noon)

Afternoon Session  
2:00 P.M.  
Hotel Washington

MR. HERRICK: Gentlemen, I have asked the Directors of all the Regional Laboratories to stay here for a while this afternoon in case there might be some questions you would care to ask that they might be able to answer. I would like to say that we are glad to answer any questions that we can answer, but we ask your tolerance. Some of the questions are possibly a little more detailed than we are prepared to answer.

MR. BARROW: Dr. Knight, of course I know that the policy of the Bureau has been not to publicize the work that you have been doing in these Regional Laboratories. I wonder if any thought and attention has been given to publicizing the program that is being carried on. I think that the Bureau has perhaps been too modest in the past. We hear occasionally of accomplishments of this Bureau. For instance, we hear down in our immediate section, of the work which has been developed by this Bureau on sweetpotato starch. The public generally does not know that that project was originated in the Bureau and has been developed through the pilot stage under the supervision of the Bureau. I am wondering if, in this Regional Laboratory where the public is going to be watching your results very closely, a program of properly directed publicity wouldn't be a very advisable thing.

DR. KNIGHT: Mr. Barrow, I think you are right about that. We have given considerable thought to the problem of developing and getting out to the public, information in regard to our researches. The situation has changed very materially during the past ten years. Ten or twelve years ago, we didn't even have an office of information in the Bureau. The research group, the individuals, wrote up the results of their researches and there was no method at that time for getting publicity except as those publications were read by reporters or as the research men themselves might see a publicity angle to the researches that were developed. But we have been very slowly developing in the Bureau an Office of Information. This office, by the way is in charge of Mr. Teuton here who is Chief of the Information Division of our Bureau. This office takes every manuscript that is offered for publication and goes over it from the standpoint of public information. I think we are doing a very good job in this field. You spoke especially of our work on sweetpotato starch. I think possibly there is no project that has been developed in the Department of Agriculture that has received



as wide publicity, or wider publicity, than this starch project. We hear it discussed every place where there is interest concerning the handling or the use of sweetpotatoes. It is rather interesting, this development of publicity. I have found that if a good story is written for a magazine or for newspapers and is published, that we get reverberations sometimes for a period of two years or more. Some newspapers that probably didn't carry the original story as released, will pick it up later, -a year or two later, and tell the story again in their own language. We recognize the value of publicity. On the other hand, we do have a problem; we can't very well publicize promises, because then we run into the same situation that we are facing at the present time, that of making the public think that we can do things over night. So we find that it is more desirable to publicize the accomplishments and possibly the aims, keeping in mind at all times that we have to be very careful not to lead the public to think that we can solve every problem that we meet. That is a very serious matter. We expect to enlarge our information organization, and we expect to go still further than that. I may be talking off the record at the present time, but we hope to have an organization that will go into these Laboratories, all of the Laboratories of the Bureau, in fact, to see if we cannot systematize those results that may have industrial interest. That has not been done in the past. Unfortunately, I think most men who are interested in research are not interested in publicity. They are not interested in patents, and that is a matter of considerable importance in laboratories of this kind. In the first place, the scientists oftentimes overlook the publicity value of their work. They are interested only in their immediate laboratory problems and they may not see the industrial possibilities of some of their results. So it will take a different type of man to bring those things out, and we hope, with the help of the group like this, that we will be able to develop the practical points and things of public interest that I have spoken of here. I am glad you brought the matter up. Would you like to hear from our Information man, Mr. Teuton? He is here.

MR. BARROW: Yes, we'd be very happy to hear from Mr. Teuton.

MR. TEUTON: I think, Mr. Barrow, that you have covered this very well. We are in perfect agreement that there is great need for what we call the right sort of publicity. We don't need propaganda, but we should give the public the information to which it is entitled. That's only fair to the taxpayers of the country who support the Government organizations. As Dr. Knight has pointed out, the Bureau is making a special effort to see that such information gets out. I have just returned from a radio broadcast in which we spoke to the people of the country on the Farm and Home Hour program about the four regional laboratories which are all in operation except one. We have something like three or four hundred Bureau articles that go into outside journals each year. About that many originate in our Bureau every year and each one of these comes across my desk and if it has what I consider news value in it we put out a press release on it, and if it appears desirable, we write a story. Dr. Knight has written a number of articles on sweetpotato starch that appeared in leading magazines of the country. Just before the meeting this morning, there was a little item that came across my desk from one of our protein scientists.



He said he had found by looking into the merits of one of our Southern weeds that it had a value as a rodent repellent -- something that would be offensive to rodents. Rats wouldn't eat it in a test. I asked him what he was going to do with it. He said, "I was just asked to do it, it is very interesting." I said, "It is brand new. What do you think about a press release?"

"Fine" he said. So we are putting out a press release on it. If something comes in from say, the Southern Laboratory on cottonseed that is new and that we feel you folks would like to know about, we immediately put out a press release on it or give it to the public in some other form, and your names being on our list, you will receive the information.

DR. KNIGHT: We have had some rather interesting experiences in regard to the matter of publicity. We have found that it is necessary to write our own statements for the press. You can't call the press in and tell them the story, or the press can't read over the article that you have written for a scientific magazine or for a Government publication and expect to get the type of emphasis that ought to be given.

Now a few years ago we were in that position in which we had to leave those things to the public press. Let me tell you a story or two that may be interesting. When I was in West Virginia --

-- we discovered in our research a hen that had two sets of ovaries instead of one. I don't need to tell you that the possibility of increasing egg production is very much greater where there are two sets of ovaries, and we bred this hen and found that some of the progeny, the females, also had two sets of ovaries. So I called in a member of the press and told him what we had discovered and suggested the possibilities. The story went out over the AP wires: "The hen that lays two eggs a day." Of course it didn't accomplish what we had hoped to accomplish at all. That thing went over the country and for three years I was faced with a volume of correspondence in regard to the hen that laid two eggs a day. That is just one example. The problem, as you can understand, is rather an important one from the standpoint of getting out proper and accurate information to the public and also from the standpoint of getting out to the public information which they should have so that they can give intelligent support to the research that is going on.

Dr. RICHARDSON: Mr. Lynch, what estimate would you make of the cost to the regional laboratory of the problem of looking for new sources of fat? After all, we do consume more inedible fat than we produce. I don't believe you mentioned that in your plans this morning, did you?

MR. LYNCH: I don't think so.

DR. RICHARDSON: It is in your printed booklet?

MR. LYNCH: I think it is. Of course all the oil and fat chemists are agreed on that point. We do import a little more inedible fat.



DR. KNIGHT: You are talking, aren't you, Mr. Lynch, about the short chain glycerides?

MR. LYNCH: We did mention the fact that there would be some work if it shows promise on the reduction of the chain length of some of these long chain fatty acids, to produce oils like coconut or the lauric acid type oils. If we could develop an economic process, it could be immediately expanded tremendously. Of course we are not the only ones working on the same thing, we recognize that, but somebody I think will crack it some day, not one man or one group, but each will contribute something and finally be able to push the thing over.

MR. SCHWARTZ: Do you intend to elaborate your investigations with regard to fractionation of the oil to a degree that may lead to the use of some of the elements of cottonseed oil for some of the technical oils, drying oils?

MR. LYNCH: Well, of course we immediately run into competition if we try to get into that field. Of course soybeans are very much in there now. I think there is a lot of information that can be gathered and we can do that and still have the other constituents enter into the same trade channels that they enter now. Will we hurt the overall sales of the cottonseed mills, that is a thing that is getting us baffled.

MR. HERRICK: Dr. Schwartz, if I may comment on that, I think we look on these four laboratories in a certain respect as a unit. In other words, while we have different commodities in the four laboratories, we have certain problems which might be considered as common to all of the laboratories. If there is a development in the Northern Laboratory, for instance, which might be applicable to cottonseed oil, that information will be transferred and an attempt will be made to apply it to cottonseed oil. For example, if we happen to find something in the Northern Laboratory which leads to the development of conjugated double bonds, and to the development of drying qualities, let us say, in corn oil, Mr. Lynch will know about that as soon as the research is at a point where we think it will be transferable to another commodity and the Laboratory will be given an opportunity to apply that to cottonseed oil, and of course the same thing will work in other directions. We can't attempt to do all the varieties of research on oil in one laboratory, but as a matter of fact we have projects on oil in three of the four laboratories as a prominent commodity and to a minor extent in the fourth.

DR. KNIGHT: Unfortunately, I must return to the office now. I have enjoyed meeting with you today and I am sorry I can't spend the rest of the afternoon with you. I have some things requiring my attention. Thank you very much. (Leaving the conference room).

MR. LYNCH: I don't know if these gentlemen know about the coordination of the work in the Regional Laboratories; we might expand a little further on the carbohydrates and proteins as well as the oils.

MR. HERRICK: I might say that we have recognized the fact that we have certain, what I may call constituent problems which are common to more than one laboratory. In other words, that we have carbohydrates as

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CIVIL WAR IN AMERICA

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AND JAMES W. COOPER  
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JOHN R. GREEN  
WITH A HISTORY OF THE  
CIVIL WAR IN CANADA  
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AND JAMES W. COOPER  
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ADAPTED FOR CHILDREN  
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IN TWO VOLUMES  
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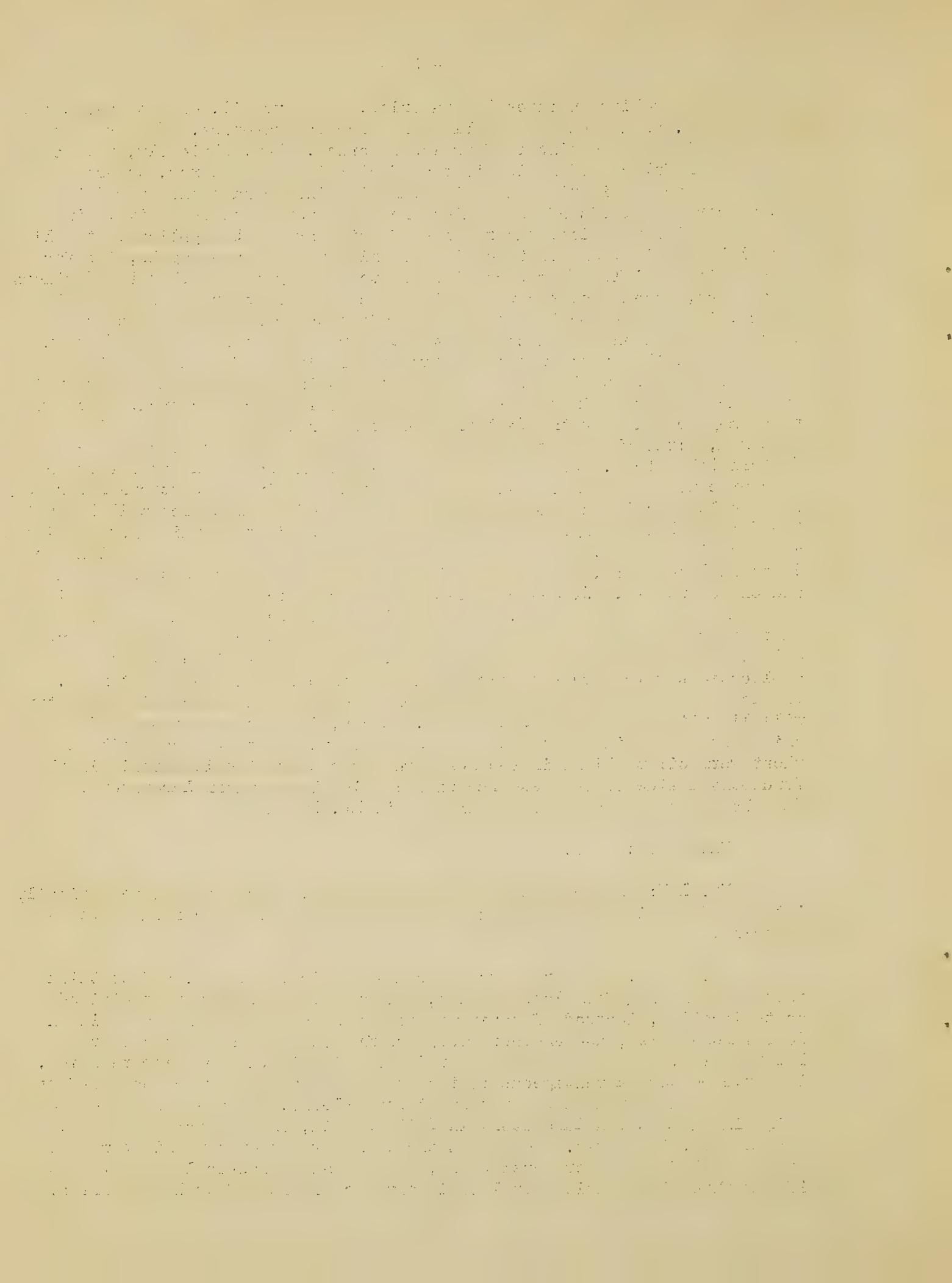
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a prominent problem in three laboratories. We have oil, or fats and oils, I might say, as a prominent problem in three laboratories. We have the consideration of proteins in four laboratories. Now, obviously, unless we give careful consideration to that factor in our research, we are going to have duplication, and with that in mind we have endeavored to set up certain fields of work which are to be worked on intensively in one of the laboratories, the results of which are to be applicable to all four laboratories, or all three laboratories as the case may be, insofar as that is possible. Now I can illustrate that by saying that the Northern Laboratory, because of the work which it has on cornstarch and on wheat starch, is going to be the center of fundamental carbohydrate research. That does not mean of course that the Eastern Laboratory and the Western Laboratory will not be free to follow certain lines of work on white potato starch or sweetpotato starch, but that the Northern Laboratory will take the leadership in the field of fundamental starch research. The same thing may be said for the Eastern Laboratory in the field of protein research, although we have alfalfa proteins and wheat proteins in the Western Laboratory. We have corn proteins in the Northern Laboratory and of course we have peanut meal and cottonseed meal in the Southern Laboratory, but the leadership and the fundamental phases of the research will lie with the Eastern Laboratory. And then coming to a subject in which you gentlemen are most interested, the fundamental leadership in oils will lie with the Southern Laboratory, because they have there the work on cottonseed oil and on peanut oil. It may be a little difficult to understand and it is a difficult problem to handle, but I don't mean to say that the Southern Laboratory is going to be debarred from any given type of work on peanut oil and meal or cottonseed oil and meal, but they will investigate the applications which are specific to the cottonseed meal and peanut meal. The leadership in the fundamental problems of protein and casein chemistry will lie with the Eastern Laboratory. Again, if I may refer to lard, animal fats and oils in the Eastern Laboratory, and to the corn oil and wheat germ oil problems in the Northern Laboratory, the leadership in the fundamental side of the research will lie in the Southern Laboratory. Was that what you wanted me to bring out, Mr. Lynch?

MR. LYNCH: Yes.

MR. LAW: As we brought out this morning, this group is very vitally interested in all three of those problems, the fats, the carbohydrates and proteins.

MR. LYNCH: We have given it consideration, Mr. Law, and we think instead of having four laboratories, although they are somewhat divided as to location, instead of having a group working on carbohydrates in the four laboratories, and another group working on proteins in the four laboratories, and another group working on oils in the four laboratories, it would be more advantageous to the whole program to have a heavy effort on oils in the Southern Laboratory at New Orleans, a heavy effort on proteins in the Eastern Laboratory in Philadelphia, and the carbohydrates, for example, in Peoria. Now it is true, and even though we might want to withhold it for further development, we know as a practical problem that if something interesting develops in any one of these four laboratories,



say an interesting development on corn oil, and of course we will know it before the general public, but if it does get out to the general public, we would necessarily have to jump right in and apply it to cottonseed oil on that? Are you doing anything on it? Of course we would have to know about it ahead of time to have an answer on that. The same thing is true of proteins. We know if something developed in the casein work we would have to try it out on peanut protein and cottonseed protein to have an answer, because these are set up on a commodity basis and after all we have got to sell the commodity itself. In the case of cottonseed oil, if you expand oil production by improving recovery from the seed and at the same time retain the uses and markets for the residual meal and other constituents (linters, etc.) you are improving the overall use of the commodity.

DR. RICHARDSON: You spoke of concentration of carbohydrate research in the Northern Laboratory but didn't say anything specific in that connection on cellulose. What about the more basic research on cellulose? Would that also be in the Northern Laboratory?

MR. HERRICK: We haven't really decided that definitely. In the Southern Laboratory, for instance, there would be a great deal of work done on the cotton fiber, which is of course pure cellulose. On the other hand, in the Northern Laboratory we are going to consider the adaptation of agricultural residues to the production of certain types of paper and also dissolving cellulose, --I believe that is the correct phrase which we now use for the material we formerly called industrial cellulose,-- and in the Western Laboratory we shall concentrate on hemicellulose, although a certain amount of work has to be done on that in the Northern Laboratory. I picked out deliberately the three easiest general constituents to discuss, rather than some of them which are not quite so easy to place in one location.

DR. RICHARDSON: If you had such a line of work as Mrs. Farr was conducting at the Boyce-Thompson Institute, do you know where you would place that?

MR. HERRICK: Yes, in the Southern Laboratory.

MR. BARROW: Mr. Lynch, I don't know whether I fully understood from your outline of the program whether you contemplated any project on the whole cotton plant.

MR. LYNCH: In the write-up of this program we have included the possible program of projects on the whole cotton plant, just the same as some of the projects on the oil. After all, we have a considerable amount of money, it is true, but there are always more projects than money, and if I remember rightly, I think we had some counsel and advice that led us to limit any work on the whole cotton plant.

MR. BARROW: I wondered if you intended to supplement that work or if it is to be continued by Dr. Cameron.

the condition of the soil and the frequency of rainfall. It is often difficult to get rid of the weeds in the field, but the best way is to cultivate the land frequently. This will help to reduce the number of weeds and also to increase the yield of the crop. Another way to control weeds is to use herbicides. These are chemicals that kill weeds without harming the crop. They are usually applied at the time of sowing or after the crop has grown for a few weeks.

It is important to maintain a good drainage system in the field to prevent waterlogging. Waterlogging can cause the soil to become saturated, which can lead to root rot and other diseases. It is also important to keep the field free from pests and diseases. Pest control can be achieved by using natural predators or by applying pesticides.

Finally, it is important to maintain a healthy soil. This can be done by adding organic matter to the soil, such as manure or compost. Organic matter helps to improve the soil's texture and structure, and it also provides nutrients for the plants. It is also important to avoid over-tilling the soil, as this can damage the soil structure and reduce its fertility. Instead, it is better to use conservation tillage techniques, which involve minimum soil disturbance and maximum soil protection.

In conclusion, growing vegetables in a field requires careful planning and attention to detail. By following these simple steps, you can grow healthy and delicious vegetables in your own field.

### COMMON VEGETABLES GROWN IN A FIELD

There are many different types of vegetables that can be grown in a field. Some common ones include:

1. Cabbage: Cabbage is a leafy green vegetable that is rich in vitamins and minerals. It can be eaten raw or cooked, and it is a good source of fiber. Cabbage is also a good source of antioxidants, which help to protect the body against disease.

2. Carrots: Carrots are a root vegetable that is rich in beta-carotene, which is converted into vitamin A in the body. They are also a good source of fiber and potassium.

MR. LYNCH: The work is not only continuing there but I think also at V.P.I. There was a statement just recently in the Virginia Chronica Botanica to the effect that we were not going to do any work in this field which, incidentally, is not true. We will at least consider any problems that any of these organizations and companies have, but we have only so much money for research, and necessarily we will have to trim our sails to fit it. We hope in this case that we will have the advice of industry as to the value of our results and it is possible that something will occur in connection with the research on the whole cotton plant that would change the estimation of the men who are not impressed with its possibilities right now in which case we might throw quite a bit of effort on it, but at this time, however, it does not look very promising.

MR. BARROW: That is exactly the reason I brought it up. I think you correctly state the views of this Committee that any program on the whole cotton plant ought to be approached with the greatest caution.

MR. LYNCH: If we are going to get anything accomplished in the allotted time, we haven't the time to build entirely new industries.

MR. BARROW: I think you would encounter considerable opposition in any attempt to revolutionize an industry.

MR. LYNCH: We have no illusions on that at all, and it has had a little dampening effect on even the proposed work on solvent extraction of cottonseed oil.

MR. BARROW: That would lead to revolution of our industry.

MR. LYNCH: Revolution in an industry that hasn't any too much money.

MR. BARROW: Gentlemen, don't you think, after all, that the choice of hydraulic extraction, or the expeller extraction, or solvent extraction, is largely a matter of economics?

MR. LYNCH: Yes. That is true and if the economic advantage is slight or if you can get more oil out but if your meal is not going to be as valuable, as Dr. Stevens pointed out, --- you have to utilize all those things to get an economic return to the oil millers or they can't pay the money for the oil seeds, --- then the process is not very practical.

MR. BARROW: That introduces a question we would like to ask, - has there been any effort made to obtain information from abroad on disposal and use of the extracted meal from various vegetable products?

MR. LYNCH: Yes, there is some information, Mr. Barrow, but it is not too complete. They are moving rapidly in the solvent extraction field, and I believe, - subject to correction by some of these gentlemen actually in industry, - one plant in South America is solvent extracting cottonseed.

MR. RICHARDSON: Broadly speaking, the best information I have on the subject is that solvent extraction of cottonseed has never been a real success. So far as solvent extracted meals are generally concerned, I



believe that in the world markets outside of this country the extracted meal has not sold at a discount as compared with the expeller or hydraulic press meal.

MR. BARROW: What percentage of the industry outside of this country is producing extracted meal?

DR. RICHARDSON: I think that practically none of the cottonseed meal is produced by solvent extraction, and for the most part in Europe the solvent extraction is the principal process used for materials other than cottonseed. I believe that is a fair statement.

MR. BARROW: It does not apply to cottonseed, as I understand.

DR. RICHARDSON: As far as I know it has never been applied to cottonseed over any long period of time in Europe, -- or on any except an experimental basis. Now that statement may be too extreme but practically speaking I think that it is correct.

MR. LYNCH: That is very close to our information. We have some information to the effect that in Europe the reextraction of imported expeller or hydraulic cake by solvents is carried out to recover the residual oil. In fact a similar practice is carried out with expeller pressed corn germ in this country. The residual meal in these cases is marketed without prejudice.

MR. HERRICK: Mr. Paine, as a matter of information, is the extraction method applied to tung oil in Europe?

MR. PAINE: No, I don't know that any tung oil is extracted in Europe. Here is something that occurs to me in which probably this group will be interested, that is, the feeding of sweetpotatoes and cottonseed meal. I don't know if you are aware of certain trends in the matter of sweetpotato starch production in relation to the use of cottonseed meal for feeding. In the first place, as a byproduct of sweetpotato starch, there is obtained a residual pulp, which has been sold in Mississippi to dairymen ever since the starch factory in Laurel started, and is being mixed with cottonseed meal, and out of that has grown the idea that probably some of the limitations in feeding cottonseed meal are not due to anything inherent in the cottonseed meal, but to improper mixture. The importance of carbohydrates in the digestion and assimilation of fats is well known. We know that the South generally has not had sufficient feed of high carbohydrate content to balance nutritionally the feeds of substantial protein and oil content, such as cottonseed meal, peanut meal, etc. The yield of corn per acre is low and the cost is relatively high. That the South needs is a greater amount of cheap carbohydrate feed to balance cottonseed meal and similar feeds. That idea has been accepted by most of the Experiment Station Directors in the South, and at the present time there are seven Southern Experiment Stations which are conducting feeding tests with sweetpotato meal (dehydrated ground sweetpotatoes) mixed with cottonseed meal in comparison with corn and cottonseed meal. Farmers in South Mississippi have usually fed not



more than 15 percent cottonseed meal in their cattle rations. In feeding tests with dehydrated sweet potatoes at Laurel, Miss., this percentage has been gradually increased to about 30 percent cottonseed meal with very satisfactory results. The idea has thus been developed that the South's needs for carbohydrates can be supplied better in the form of sweetpotatoes than in the form of corn. In the form of sweetpotatoes it is possible to produce about two tons of starch per acre in the ground. That is at the rate of three hundred bushels of sweetpotatoes per acre of 23.8% average starch content, which has actually been attained by numbers of farmers in the Laurel, Mississippi, area. Eighty bushels of corn per acre produce about 1.4 tons of starch per acre and the average for white potatoes in Aroostook County, Maine, is about one and a fourth tons of starch per acre. Thus, the South itself might possibly consume much more cottonseed meal in feeding for the development of a cattle industry by making available cheaper and more abundant carbohydrate feed for a balanced cattle ration.

MR. BARROW: From what I know of the situation around Laurel, I know what you say is true, that the demand for sweetpotato meal is out of proportion to its value by reason of its popularity for mixing with cottonseed meal. Could you tell us the protein, fat and carbohydrate content of this meal offhand?

MR. PAIN: The starch content of the meal, dried to about 12 percent moisture content, is 72 to 75 percent.

MR. BARROW: Of the meal?

MR. PAIN: Yes. I cannot give you the exact figure for the protein content, but it is very small.

MR. BARROW: Primarily carbohydrates.

MR. PAIN: It is primarily a carbohydrate feed.

MR. LAW: Isn't it true that the developments of the last few years have revolutionized feeding experiments anyway, in that in the South the tendency has been to determine the maximum amount of protein that can be used with the minimum amount of carbohydrates, and just the opposite to usual practice in the Midwest? With the soybean coming to the fore in the Midwest and the sweetpotato in the South, many entirely new programs will have to be conducted to try to find a balance.

MR. PAIN: I think it has been generally conceded that the South has been feeding protein in relative excess.

MR. BARROW: The South has had to, -- the carbohydrates have been so expensive.

MR. PAIN: They need an abundant supply of sufficiently cheap carbohydrates to balance the available high protein feeds. I think the day will come when the South will produce cattle for the food market in substantial numbers.



MR. BARROW: Just as a matter of information bearing on the food development of the regional laboratories, just how is this process for starch conversion in sweetpotatoes, how is that licensed?

MR. PAINE: That is covered by a Public Service patent.

MR. BARROW: Public Service patent and any one can use it by paying -- do they pay a royalty?

MR. PAINE: No.

MR. BARROW: No royalty at all? Has there been an extension beyond the Laurel plant?

MR. PAINE: There is a commercial plant at St Francisville, La.

MR. LAW: Mr. Lynch, in reference to this citrus pulp which is becoming quite an industry in Florida and, I understand, in California, -- where they have taken the refuse from the canning of grapefruit juice and other citrus residues of that kind, drying and grinding the pulp. There is quite a tonnage of citrus pulp produced in Florida now, and it compares very favorably in all feeding tests with beet pulp. Would investigation of a citrus product of that type come under you or under the Western Laboratory?

MR. LYNCH: I think there will be work in California, but I think the man to give you information on that is Mr. Hollingshead. I think he knows more on that than I do.

MR. HOLLINGSHEAD: That has been developing quite satisfactorily. Most of the technical bugs I think have been worked out of the process and production is going up very satisfactorily in Florida and in the Valley in Texas and on the Coast in Southern California.

MR. LAW: That is a rather high carbohydrate feed, isn't it?

MR. HOLLINGSHEAD: As you say, it is just about equal to beet pulp.

MR. BARROW: Dr. Swenson, in our discussion yesterday the question arose with reference to the possibility of getting samples of walnut oil and the question arose whether there was any of that produced commercially in California and whether it was used as an edible oil or paint oil. Possibly you can give us some information on that.

DR. SWENSON: I am sorry, I don't have any information on that. My understanding is that there is not a great deal of that material produced. Those products are directed into definite trade channels. That happens to be one commodity that I haven't much information about. I will be very glad to look into it.

MR. BARROW: Dr. Stevens was interested in obtaining samples of walnut oil in order to carry on some of his work.



DR. JAMIESON: Quite a little walnut oil was made in California some time ago. There were some edible nuts, shelled nuts, that became infested with insects and were thrown out by inspectors, so they pressed out the oil, seventy or eighty thousand pounds. We always have some oil made out there, not any great quantity, but it is variable, and that was on top of the usual run of oil they make.

MR. LAW: It could be used for paint oil?

DR. JAMIESON: Oh yes, it is a strong drying oil, some of the scenery in Hollywood has been painted with walnut oil. Walnut oil was the first kind used for portrait painting and so on in the first century. Linseed oil is a very late development as a drying oil. The California production is not regular but every now and then some walnut oil is refined and goes into the edible trade. Mostly when it is not refined it is bought up by local soap manufacturers. That seems to be the usual practice.

MR. BARROW: Dr. Stevens, I would suggest you get in touch with Dr. Jamieson. He is the right man to see.

MR. FASH: Dr. Jamieson is the right man to see about almost anything that has to do with oil.

MR. BARROW: Dr. Lynch, when we adjourned our discussion in the Bureau this morning, we were in the midst of consideration of transfer of our Fellowship from the Bureau here in Washington to the Southern Regional Laboratory. Without asking for any commitment from the members of the Committee, I would like to know if you have anything to say on that.

MR. LYNCH: I think that was between the Committee and the Bureau.

MR. BARROW: We are more than satisfied with the fine cooperation which we have enjoyed here in the Bureau and I am confident that we would be equally satisfied with the cooperation we would have at the Regional Laboratory, and as Dr. Knight very graciously expressed it this morning, it is for us to decide whether we want the Fellowship in Washington or in New Orleans.

MR. LYNCH: I have discussed this with the Chief and the Assistant Chief in a preliminary sort of way. I didn't want to quote them because I haven't seen them to talk to since we started that discussion this morning, but that was the impression I got, that the Bureau, as I already stated, is very desirous of continuing this cooperation. If we have done anything for the Committee we have certainly benefited as much or more, from our viewpoint. We hope that this method of dealing with problems of mutual interest will continue, and probably it will continue along the lines desired by this Committee.

MR. HERRICK: I would like to reiterate what Dr. Knight said, Mr. Barrow, that you can be sure of 100 percent cooperation from the Bureau, wherever you choose to place your Fellowship.



MR. BARROW: I want to say on behalf of the Committee regardless of whether we remain where we are or transfer to the Regional Laboratory, you gentlemen may be assured of continuance of the cooperation of our Committee, not only here at the Bureau, but we expect to keep in very close touch and we shall continue to be tremendously interested in the work of the Regional Laboratories.

MR. HERRICK: We are counting on that, Mr. Barrow.

MR. LAW: It would still be advisable to have our meetings here and bring Mr. Lynch to them.

MR. HERRICK: Is there any further discussion this group would like to bring up? Have you any further matters you would like to bring up, Mr. Barrow?

MR. BARROW: I don't think so, Mr. Herrick.

MR. HERRICK: If there is no further discussion, I will suggest that this meeting be considered adjourned.

MR. BARROW: I would like to ask the Committee to remain for a few minutes. We want to thank you gentlemen for the graciousness and the time you have given us. We appreciate the opportunity of again meeting with you.

MR. HERRICK: Thank you very much. It has been a great pleasure to all of us, Mr. Barrow.

(The conference then adjourned at 3:00 P.M.)

